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# INDOT 2000-2025 Long Range Plan

## Highway Needs Analysis

### Overview

The statewide transportation planning process provides for the identification of highway needs through a comprehensive process of the review of past planning studies, current planning programs, and the quantitative analysis provided by the application of the statewide system planning tools.

### Previously Identified Projects

The first step in the statewide expansion needs analysis process was to identify projects which have already been documented as a need in some form of previously conducted transportation planning and/or programming study. The primary sources for this identification process were: (1) the INDOT Production Schedule, (2) the MPO Long Range Plans and (3) the INDOT 20 Year Listing of Projects. The same project may be identified by each of the three identification sources. Therefore, the listing of overall project costs for the various listing of needed projects overlap with one another.

#### INDOT Production Schedule

The INDOT Production Schedule is a six to ten year program of projects under development (past planning) by INDOT. The production schedule provides a template of development activities and associated time requirements for each project. These required development activities outline a process which includes: (1) Engineering Assessment, (2) Environmental Assessment, (3) Design Plan Development, (4) Land Acquisition and (5) Construction. Development time for capacity expansion projects (interchange modifications, new interchanges, added travel lanes and new road construction) requires a minimum of seven to eight years, assuming no delays and existing funding.

Projects which have been programmed into the production schedule have generally originated through the INDOT District development process and the Central Office planning and programming project identification activities. Potential projects are identified through the Program Development Process (PDP) which includes annual meetings with the Districts and MPOs. The Federal-Aid projects programmed for the first three years of the production schedule provide the basis for the Indiana Statewide Transportation Improvement Program (INSTIP). The INSTIP is presented for transportation stakeholder and public review and comment in a series of INDOT District Meetings held in late summer (as well as distribution to the MPOs for their public involvement process). At these meetings, information is also provided on projects in the production schedule which

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are beyond the three-year program of the INSTIP. Approximately 300 capacity expansion projects were identified from the INDOT production schedule with an associated funding requirement of \$ 5.8 billion.

### **MPO Long Range Plans**

The twelve Indiana Metropolitan Planning Organizations (MPOs) provide comprehensive transportation planning analysis for project identification in the state's major urban centers of over 50,000 population. Each MPO is required by federal regulations to develop a twenty year transportation plan identifying transportation needs on the state and local jurisdictional roadway systems. The MPOs also carry out a multimodal planning process identifying potential public transportation, high occupancy modes, and bicycle / pedestrian transportation improvements where warranted.

### **INDOT 20 Year Listing of Projects**

The INDOT 20 Year Project listing was developed in 1995 following the adoption of the Statewide Long-Range Multimodal Transportation Plan to assist the MPOs in developing the ISTEA mandated fiscally constrained long-range plans for their respective planning areas. A listing of state highway jurisdiction projects for the 1995 to 2015 time frame was developed for each of the state's twelve MPOs and each of the six INDOT Districts. Projects were developed as one of three categories:

1. Projects for the 1995 to 2015 timeframe from traditional state and federal funding assistance programs and are anticipated to be implemented. Three implementation phases were identified, (1) 1995 to 1999, (2) 2000 to 2006, and (3) 2007 to 2015
2. Projects for the 1995 to 2015 timeframe which are not programmed with traditional state and federal funding and require special federal funding to advance towards implementation.
3. Projects which have been proposed for implementation, however due to fiscal constraint issues have been delayed outside the 20 year planning timeframe and identified as "Identified Problem Areas for Future Study". An implementation phase for these projects was identified as "future".

The total identified transportation system improvement needs for added capacity type projects were compared to the anticipated transportation funding revenues forecast for 1995 to 2015. Anticipated funding shortages were identified over the twenty year time frame. Projects to be deferred were identified through a process of planning and engineering judgements in consultation with the MPOs and Districts. The projects identified for each MPO were presented for review and comment as part of the plan development process. The INDOT 20 Year Project listing provided guidance to the state's MPOs in determining the amount of state transportation resources for state jurisdictional improvements each MPO could expect to receive over the twenty year time frame for their transportation plans. The projects identified in the INDOT 20 Year Project listing were presented for transportation stakeholder and public review and comment in a series of INDOT District Meetings held in the summer of 1995. The INDOT 20 Year Project listing in its 1998 Update to include the Crossroads 2000 projects, identified 317 proposed capacity expansion projects with a funding requirement of \$6.7 billion.

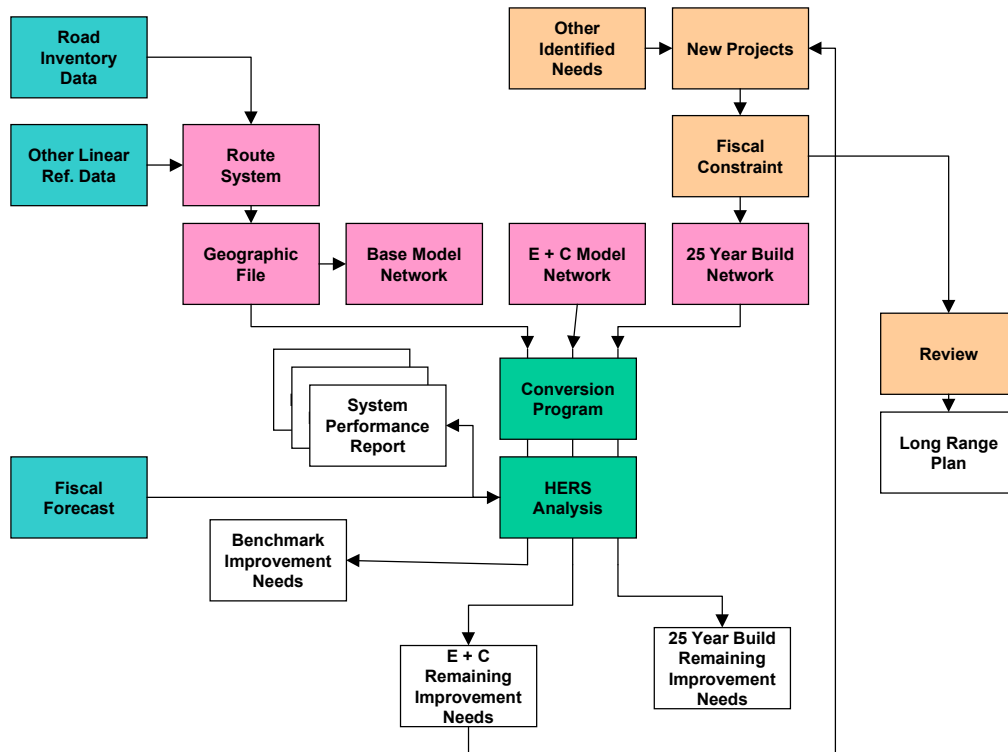
## Statewide Technical Needs Analysis

An effective statewide transportation planning process depends upon the ability to conduct a quantitative analysis measure of transportation system performance and the impact of transportation improvements. The 1995 Statewide Long-Range Multimodal Transportation Plan identified this planning objective: "INDOT will develop a comprehensive set of planning tools that will allow for system-level analysis of the state transportation system. These tools will include a geographic transportation information system, multimodal travel demand forecasting capabilities, and methodologies to identify the economic impact of transportation investments." Technical planning tools developed to address this objective include:

- TransCAD based Statewide Travel Demand Model and Geographic Information System
- Major Corridor Investment Benefit Analysis System (MCIBAS)
  - Corridor Travel Demand Analysis
  - Benefit/Cost Analysis Framework
  - User Benefit Analysis---(NET\_BC)
  - Economic Impact Modules (Business Attraction, Business Expansion, Tourism)
  - REMI Economic Simulation Model
- Indiana Highway Economic Requirements System (HERS\_IN)
- INDOT Management Systems (Coordination with pavement, bridge, public transportation, intermodal, congestion and safety management systems).

These system planning tools provided the basis for the INDOT needs analysis. The results of the travel demand model provided the foundation for the needs analysis. The key elements of the system planning tools and their relationship to the travel demand model are shown in the graphic below. Future traffic forecasts were used to identify future capacity deficiencies. In addition, future travel demand growth rates provided the primary input into the HERS\_IN needs analysis model to identify added travel lanes improvements. At each decision point in the identification of deficiencies and potential improvement selection process, the output of the transportation system planning tools were reviewed by experienced transportation planners and project development engineers from each of INDOT's six districts and twelve MPOs. This continuing review by local experts rationalized the output of the quantitative analysis with engineering and planning judgement.

**Figure 9-1 Statewide Technical Needs Analysis Process**



## Roadway

The roadway data used in the statewide transportation planning process is obtained from the INDOT Road Inventory File maintained by the Program Development Division. This computer data base provides a comprehensive inventory of roadway physical features and traffic count information necessary for the development of the system planning tools. The development of the TransCAD based routing system and GIS allowed the creation of electronic databases through the process of dynamic segmentation. This database provides the foundation for the statewide planning tools and the ISTEA management systems.

## Highway Capacity

The ability of a roadway to carry traffic provides the basic input for the identification of needed highway improvements for added travel lanes and new roadway construction. The highway capacities used for the establishment of system needs were developed through coordination with the Division of Program Development's Congestion Management System. The highway carrying capacities were developed using the procedures of the Highway Capacity Manual.

## TransCAD GIS & Network Development

The TransCAD GIS based statewide travel demand model provides the cornerstone for the system planning tools and for the coordination with the INDOT Congestion Management System and Safety Management System. INDOT's initial statewide travel

demand model has 651 internal traffic analysis zones, and 110 external zones which are a combination of transportation analysis zones and external stations. As noted elsewhere in this document, the TransCAD GIS and base year state jurisdictional highway system network was initially developed in the Intermodal Management System and then developed into a statewide travel demand model in the Major Corridor Study. In the initial development of the GIS, the basis of the statewide network was the Casper snow removal system developed from the Census Tiger files by the INDOT Engineering Graphics section. This base network was populated with roadway characteristics from the dynamic segmentation of the INDOT Road Inventory file using the TransCAD routing system. The resulting network provides a base for the development of the statewide travel demand model.

### **Existing Plus Committed Network**

The initial TransCAD GIS based statewide travel demand model was developed with a base year existing 1998 network. The next step is to include the highway improvements which are sufficiently advanced in their development process to indicate with a high degree of certainty that the project will be completed. To be identified as a “committed” improvement, the project in question must have its associated environmental studies completed or underway. These committed projects in addition to the existing network, provide the analysis network to identify system capacity deficiencies. The process of identifying committed projects resulted in 108 projects at an approximate cost of \$1.5 billion being identified. Base year and future traffic is assigned to the existing and committed network to identify the location of deficiencies. The HERS\_IN program uses the improvements coded into the existing plus committed network to perform the needs analysis. This network then becomes the base network for the development of future networks with new improvements coded in.

### **Travel Demand Model Forecasts**

Traffic growth rates from the Indiana Statewide Travel Demand Model are used to identify future year traffic volumes on specific highway links. The Statewide Travel Demand Model develops future year traffic volumes based upon forecasted socio-economic growth. Over the 2000 to 2025 time period, statewide population is forecasted to increase 17%, statewide employment is forecasted to increase 30%; however, travel demand is estimated to increase much more rapidly at 62%.

## **HERS\_IN Model**

One of the system planning tools developed for statewide transportation plan development is the Highway Economic Requirements System for Indiana (HERS\_IN). HERS\_IN is a long-range planning tool for the analysis of highway system investments. HERS\_IN is developed from the National Highway Economic Requirements System developed by the Federal Highway Administration (FHWA) for national highway investment analysis. The FHWA model is used in conjunction with the national Highway Performance Monitoring System data collection program to prepare a biennial report on the state of the nation's highways entitled the *Conditions and Performance Report to Congress*. INDOT has modified the national model for specific application to Indiana's highway system analysis needs in developing HERS\_IN. The major modifications for HERS\_IN are focusing the analysis on added travel lanes projects which add capacity to the highway system, the use of INDOT's computer database, the road inventory system to provide a 100% sample of

our state jurisdictional highway system, and the use of a geographic information system (GIS) approach to all statewide mapping and display.

HERS\_IN identifies needed added travel lane improvements by calculating highway capacity deficiencies over the year 2000 to 2025 planning period. HERS\_IN evaluated these forecasted highway deficiencies using a cost/benefit economic analysis approach to identify the need for an added travel lanes project and the most appropriate time period to make the improvement. HERS\_IN identifies a potential added travel lanes project, calculates the estimated cost of the improvement, compares that to the project benefits (travel time savings, reduced accidents, and vehicle operating expense), and assigns the improvement to one of five improvement phases on the basis of a cost/benefit ratio.

HERS\_IN provides a statewide highway analysis tool, which allows the testing of a wide range of “what if” scenarios. The analysis can evaluate the system performance impacts of using different levels of benefit/cost ratios to select highway investments, the use of different capacity levels to identify deficiencies, and the use of alternative levels of investments. The HERS\_IN analysis, at this time, is limited to the evaluation of the existing highway system. The analysis of new highway links, such as new inter-city highways providing new connections, need to be evaluated through other system planning tools such as the statewide travel demand model. In the near future, several new features of the HERS\_IN needs analysis model are anticipated to be used in the continuing statewide planning process. These include the ability to code in the entire range of proposed highway added travel and new highway connections for the development of overall system performance and calculation of benefit/cost measures for each proposed highway improvement project. See Figure 9-2.

Figure 9-2

### HERS\_IN NEEDS ANALYSIS 2000-2025

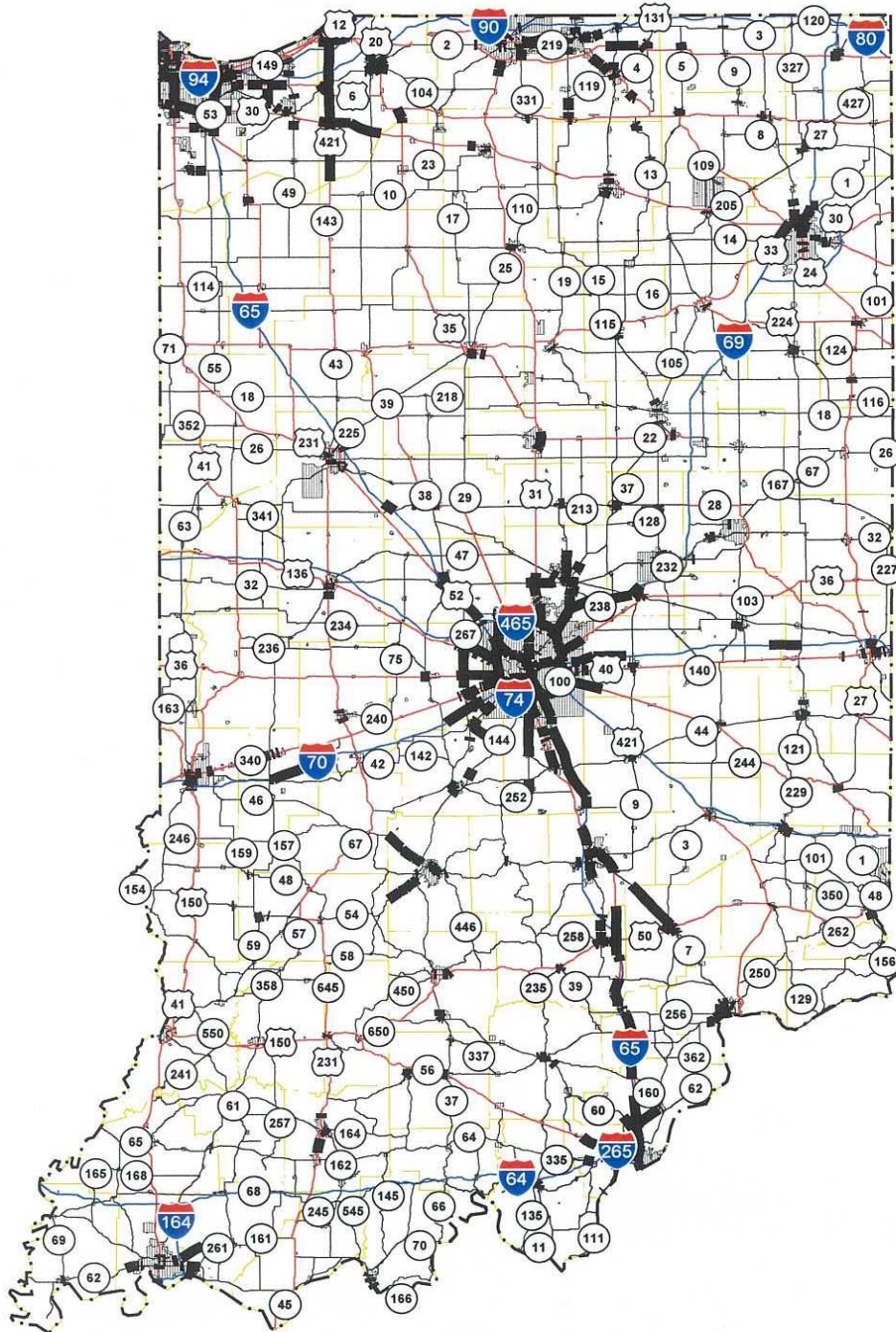
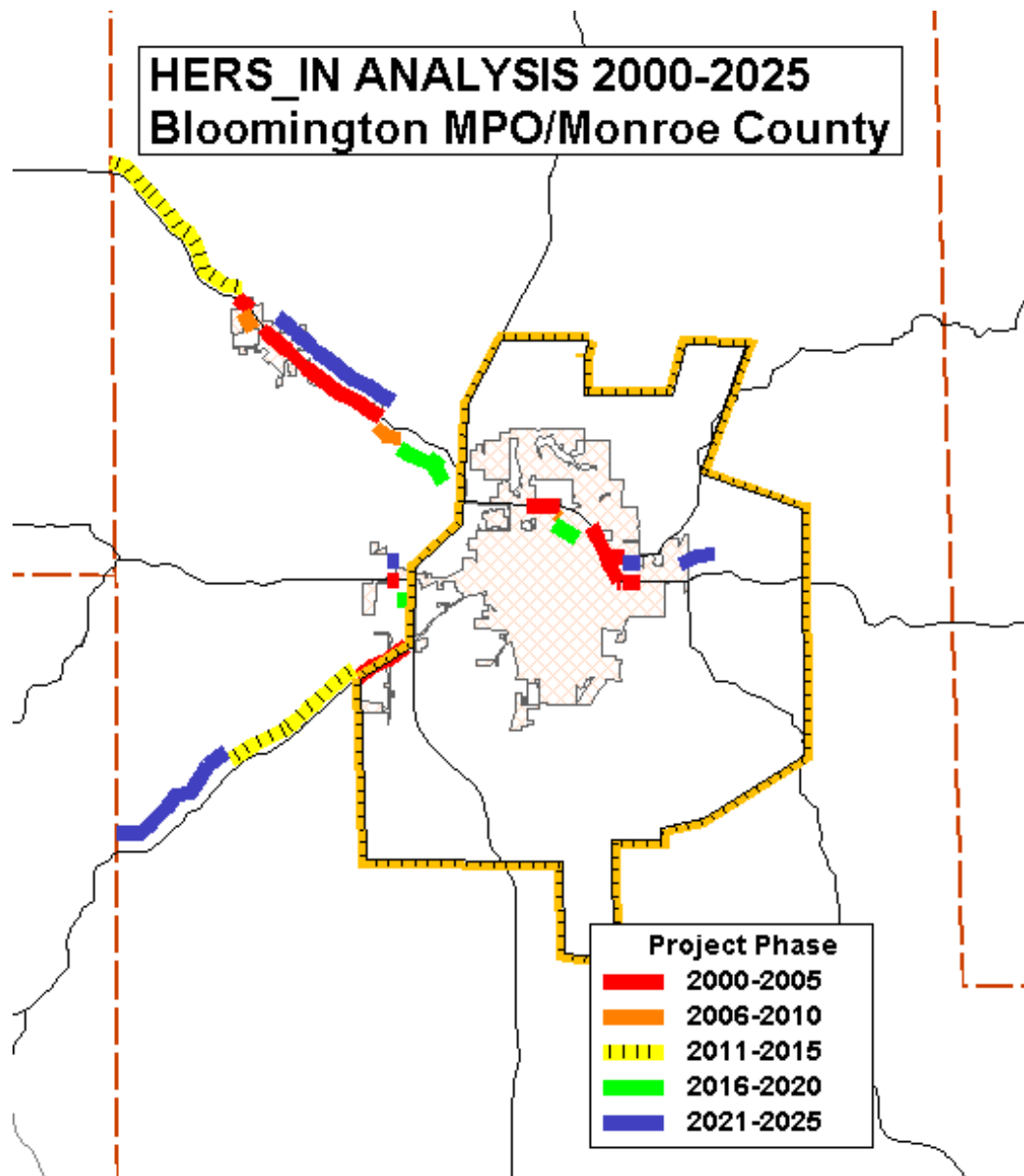


Figure 9-3





## **System Level Performance**

HERS\_IN provides an analysis of alternative highway investment levels relative to the performance of the state jurisdiction highway system. As noted above, our current analysis process is limited to the existing highway system. However, the system performance impacts of the analysis of alternative investment levels provide insight into the system benefits afforded by a comprehensive program of highway improvements.

Two alternative levels of highway system investment were evaluated for the 2000 to 2025 time period. A “no-build” alternative to identify the impacts of future travel growth without any additional highway investment is compared to a “full needs” scenario which allows the selection of any HERS\_IN identified highway improvement. The analysis used capacity criteria or “minimal tolerable conditions” of 0.75 (roughly Level of Service C) for rural highways and 0.95 (roughly Level of Service D) for urban highways, for the reporting of congestion levels. Travel demand as measured by vehicle miles of travel is estimated to increase 62 % over the 25-year period from 2000 to 2025.

The no-build scenario resulted in the increase of congestion (as measured by highways operating above the minimal tolerable conditions identified above) from 4% of the highway mileage in 2000 to 25% in 2025. System performance as measured by overall operating speed decreased 10% from 53.4 mph in 2000 to 47.8 mph operating speed on the urban freeway system in 2025.

The full needs scenario identified 1,047 miles of added travel lanes projects with an overall estimated cost of \$3.2 billion. Assuming these improvements were made, the miles of congested highway would decrease from 4% in 2000 to 2% in 2025 (a 50% reduction). Highway system performance would remain stable with a 1% reduction from 53.4 mph to 52.7 mph speed on the urban Interstate System. The full needs analysis places 66% of the roadway improvements in urban areas (communities of over 5,000 population). In terms of Interstate System improvements (\$1.473 billion overall), 110 miles were in rural areas and 190 miles in urban areas. The urban split is more pronounced in terms of additional lane miles, 236 lane miles in rural areas (an average 2.1 additional lane miles per mile of widening) and 621 lane miles in urban areas (an average 3.3 additional lane miles per mile of widening). For the principal arterial functional classification, the HERS\_IN identified improvements totaled \$1.388 billion) with 91 miles of improvements in rural areas and 475 miles in urban areas. For the lower functional classifications, HERS\_IN identified a lower level of improvement needs, \$328 million focused primarily on the rural areas.

## **Project Identification and Rationalization**

The HERS\_IN improvement needs were used as one element in the overall process of determining statewide proposed highway improvements. The HERS\_IN improvements were selected without data on the actual feasibility of highway widening (a future feature for the continuing planning process). In addition, HERS\_IN improvements are identified and a rationalization process is required without the overriding parameter of system continuity to establish logical project limits. In order to use the HERS\_IN information for project identification, a review process was conducted with District, MPO and Central Office personnel. As part of this process, INDOT District and MPO area maps were prepared showing HERS\_IN identified added travel lanes projects. Key local transportation personnel reviewed the initial HERS\_IN output and made necessary adjustments.

## Route Concept Reports

Route Concept Reports assist INDOT in planning for what the needs of a roadway might be in 2025, the planning horizon for this document. A Route Concept Report provides preliminary information to decision makers in all project development phases, from including a proposed project in the Long Range Plan to designing an improvement to accommodate potential future needs of a roadway. These reports are key in determining preliminary capacity needs for significant pavement rehabilitation or replacement projects, as level of service (LOS) data are presented for 18 hours of the day for existing traffic and projected to 2010 and 2025. A Route Concept Report builds upon the results of the HERS analysis by providing additional detail.

The reports provide a discussion of existing route characteristics, data from the original construction and significant subsequent projects, pavement history, average daily traffic history and projection, capacity analysis results, field check findings, socio-economic information, the improvement concept, a listing of existing projects, and the estimated cost. Generally, only mainline segments between interchanges are analyzed with the capacity analysis. If the proposed improvement concept becomes a project, more detailed analysis would take place during project development.

INDOT's initial focus is analyzing the major urban Interstates, as the agency has a goal of enhancing mobility via a Strategic Objective of implementing congestion relief strategies. Future Route Concept Reports will be conducted on the majority of the Interstate System and portions of the remainder of the state system of highways. Segments in which Major Investment Studies have or are being conducted or a capacity expansion project is being or will soon be implemented are generally not analyzed.

The following Route Concept Reports are completed. Information regarding the preliminary improvement concept and preliminary total project cost is also provided. Improvements would generally be implemented when significant pavement improvement needs exist, since this will impact the motoring public only once and provide an improved facility upon completion.

**I-65 from SR 44 to I-465 (South Leg):** Proposal includes three lanes per direction from SR 44 to Greenwood Road, four lanes per direction from Greenwood Road to I-465, plus one auxiliary lane per direction from Southport Road to I-465. Total project cost of \$114,510,000.

**I-65 from I-465 (South Leg) to I-70 (South Split):** Proposal includes four lanes per direction, plus one auxiliary lane per direction from Raymond Street to the I-70 South Split. Total project cost of \$42,900,000.

**I-65/70 from the South Split to the North Split:** The complex nature of this roadway system precludes a segment by segment listing of the recommended number of lanes here. Generally, one additional lane per direction on the mainline, system to system ramps, and collector/distributor is recommended in most locations. Total project cost of \$90,700,000.

**I-65 from the I-465 Northwest Connector to US 52 (Boone County):** Proposal includes three lanes per direction. Total project cost of \$80,110,000.

**I-70 from I-65 (North Split) to I-465 (East Leg):** Proposal includes six lanes per direction, plus one auxiliary lane per direction from the I-65 North Split to Rural Street / Keystone Avenue. Total project cost of \$106,890,000.

**I-70 from I-465 (East Leg) to SR 9:** Proposal includes three lanes per direction from I-465 to SR 9, with two auxiliary lanes per direction from I-465 to Post Road. Total project cost of \$83,500,000.

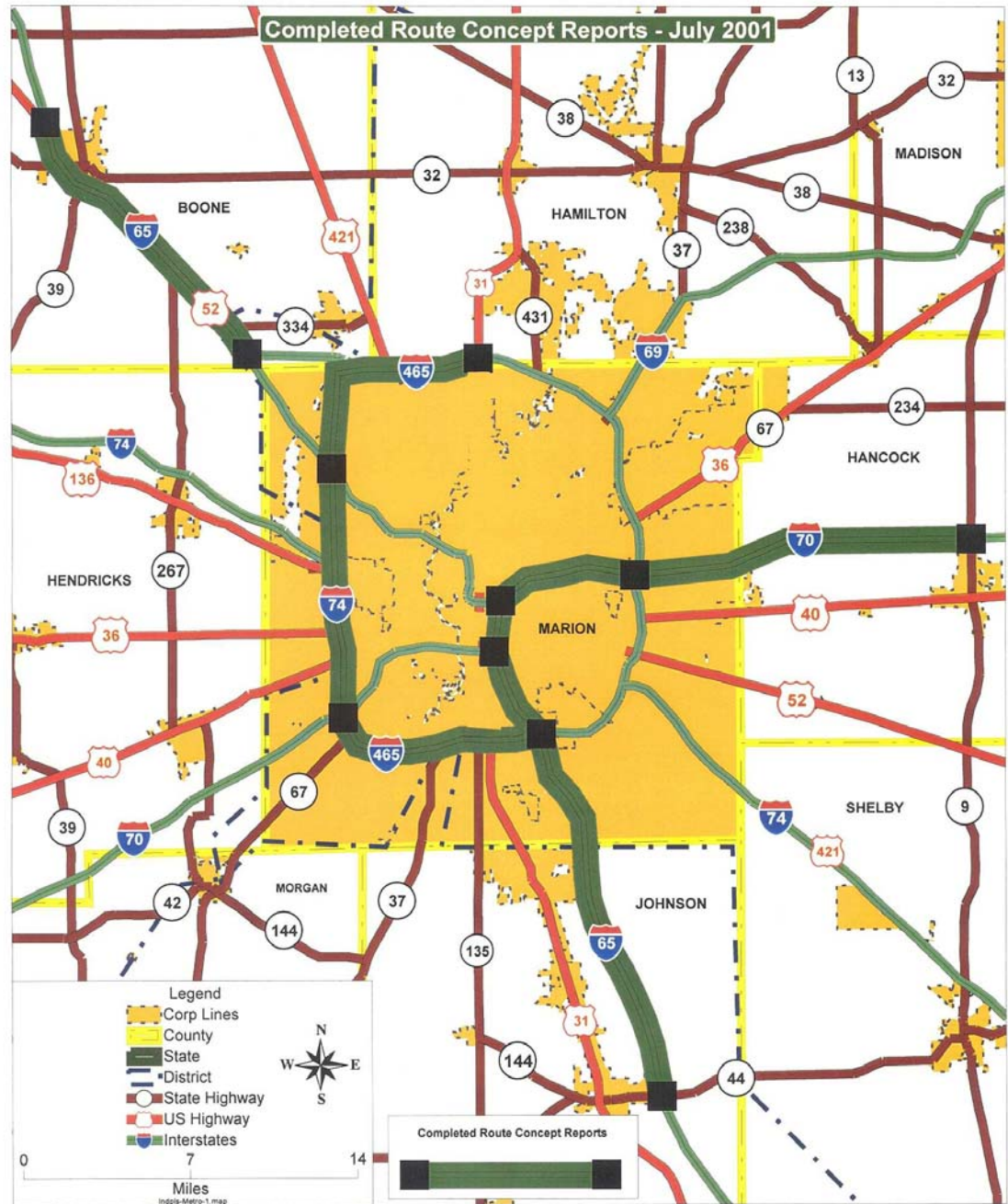
**I-465 from I-65 to I-70 (South Leg):** Proposal includes four lanes per direction. Total project cost of \$65,820,000.

**I-465 from I-70 to I-65 (West Leg):** Proposal includes five lanes per direction, or four lanes per direction plus one auxiliary lane per direction. Total project cost of \$200,000,000.

**I-465 from I-65 to US 31 (West and North Legs):** Proposal includes five lanes per direction, plus one auxiliary lane per direction from I-65 to 71st Street and from US 421 to US 31. The possibility exists for providing four lanes per direction plus the appropriate number of auxiliary lanes to match the number of lanes above. Total project cost of \$115,680,000.

The locations where the above Route Concept Reports are focussed are shown in Figure 9-4 on the following page.

Figure 9-4



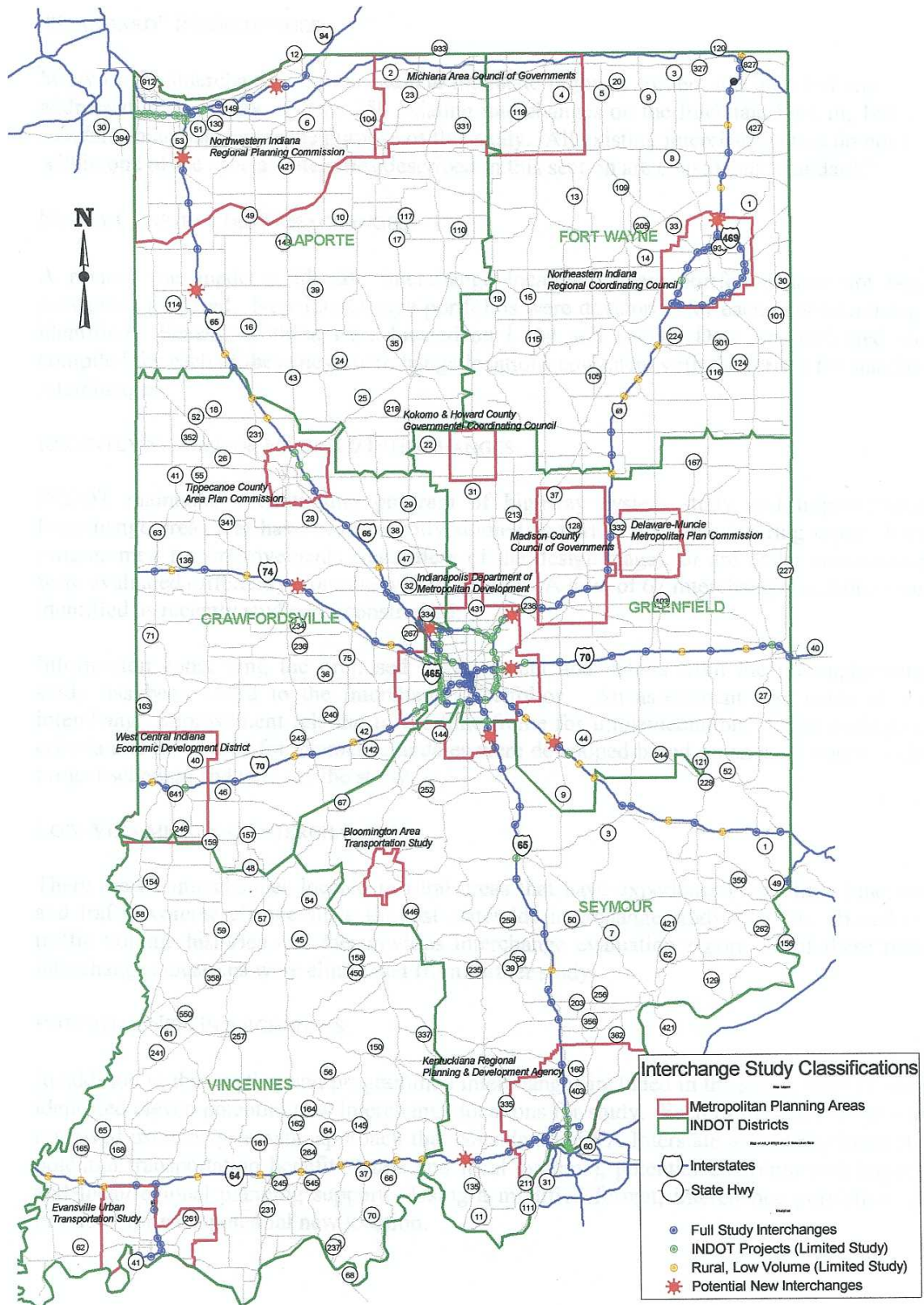
## **Indiana Interstate Interchange Study**

A major element in the development of an efficient statewide system of transportation is the provision for Interstate interchanges which operate at an acceptable level of service for traffic operations, operate safely, and are up to date relative to today's geometric standards. To address these issues, INDOT has prepared the Indiana Interstate Interchange Planning Study. This study updated the previous Interstate Interchange Evaluation Study undertaken by INDOT in the late 1980s. The interchange study has developed improvement recommendations and priorities for the nearly 250 existing interchanges on the Interstate System, plus evaluated the feasibility and need for 11 new interchange locations. The recommendations of this interchange study provide the foundation for the interchange improvement program in terms of interchange modifications and new interchange development. All Interstate interchanges are evaluated with the exception of the Indiana Toll Road interchanges, which are analyzed in a separate INDOT process. The interchange study evaluates the potential interchange improvement needs by studying the following factors: (1) accident frequency and severity, (2) future traffic volumes and interchange level of service (congestion), (3) geometric deficiencies and, (4) pavement and bridge conditions. Each interchange is placed into an analysis category. Interchanges which are under active INDOT improvement study or which have current improvement projects underway are included only in the inventory phase of the study. Interchanges in rural areas with no significant new development occurring in the area receive only limited study. The majority of study resources are directed toward interchanges located in areas with rapidly increasing development pressure and higher traffic volumes.

The interchange evaluation study has just been completed. The final report recommendations include a list of improvements and associated estimated costs per interchange. As noted above, the report's recommendations will drive our interchange modification and new interchange construction program for the next 5 to 7 years and beyond. A preliminary estimate of identified interchange improvement needs has been included in the project listings in Chapter 11. This initial estimate will be refined over the next several years into more specific project identifications. This estimate of interchange improvement needs allows for the establishment of a project category for each district's interchange program plus evaluation of fiscal constraint issues.



**Figure 9-5 Interchange Locations**



## Potential New Interchange Summary Index

Location		Justification/Benefit			Apparent Feasibility				
Interchange	County	Interstate System	Local System	Economic Devt	FHWA Rqmts	Env (NEPA)	Plan MPO	Support Local	Economic Devt
I-64 Gethsemane Rd	Harrison	X	X	included	Yes Other:	Yes	--	No	New Additional study needed to confirm benefits and preferred location
I-65 CR750N	Johnson	X	X	included	Yes* Other:	Yes	TBD	No	New Part of Greenwood Plan Update (under way) /MPO review pending
I-65 SR 14	Jasper		X	X	Yes Other:	Yes	--	Yes	Exist/New Serves emerging dairy industry; strong multi-county support
I-65 101st Avenue	Lake	X	X	included	Yes* Other:	Yes	Yes	No	New Lake County Plan Commission prefers 109th Avenue location
I-69 126th Street	Hamilton		X	included	Yes* Other:	Yes	No	No	New Suggested by Fishers/MPO review pending
I-69 Gump/Hursh Rd	Allen	X	X	NO	Yes Other:	Yes	Yes	Yes	Restricted MPO plan shows 2010 construction
I-70 German Church Rd	Marion	X	X		Yes Other:	Yes	Yes	Yes	-- MPO plan shows 2007 - 2015 construction
I-74 SR 47	Montgomery		X	X	Yes Other:	Yes	--	No	Exist/New intended to improve access for local businesses
I-74 Michigan Rd	Shelby	--	--	--	Yes Other:	TBD	--	No	-- Local plans being changed. Improve Fairland interchange instead
I-94 County Line Rd	LaPorte/Porter		X	X	Yes Other:	Yes	No	Yes	Exist Listed by MPO, but not in cost feasible plan; serves existing commercial
I-465 Cooper Rd	Boone	X	X	No	Yes Other:	TBD	No	Yes	Restricted Adopted in Boone County and Zionsville Plans MPO review pending

\*INDOT rural interchange spacing criteria of 5KM (3.11 mi) not met at this location

### Priorities - Interstate System

I-69 & Gump/Hursh Rd  
I-70 & German Church Rd  
I-465 & Cooper Rd (tentative)  
I-65 & 101st Ave (tentative)  
I-64 & Gethsemane Rd (tentative)

### Priorities - Local System

I-69 & Gump/Hursh Rd  
I-6465 & Cooper Rd  
I-65 & CR750N (tentative)  
I-65 & 101st Ave (tentative)  
I-64 & Gethsemane Rd (tentative)

### Priorities - Economic Development

I-65 & SR 14  
I-94 & County Line Rd  
I-74 & SR 47 (tentative)

### Additional study needed for consensus/justification

I-465 & Cooper Rd -- MPO plan support needed  
I-94 & County Line Rd -- MPO plan support needed  
I-65 & 101st Ave -- MPO/local consensus needed  
I-74 & SR 47 -- Local plan support needed  
I-64 & Gethsemane Rd -- Local plan support needed  
I-65 & CR 750N -- MPO & Local plan support needed  
I-69 & 126th St -- MPO & Local plan support needed

## **Summary**

The statewide transportation planning process provides for the identification of highway needs through a comprehensive process, which involves encompassing previously identified projects, conducting statewide technical needs analysis, utilizing the HERS\_IN Model, and completing Route Concept Reports. By assembling these elements, an unconstrained listing of the state's transportation needs is created. Upon creation of this listing, the next task is to filter through the projects to identify logical needs, and to prioritize the projects based on those needs.